REMARKS

Claims 1, 2 and 6 are pending. No amendments are made herein.

Nakamura discloses perfluoro-2-pentyne with a formula of $CF_3C{\equiv}CF_2CF_3$ on p.5, line 3 of WO 02/39494.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (6,270,948) in view of Nakamura et al (WO 02/39494 Al). (Office Action, p. 3)

Sato discloses an organosilicon film comprising a specific organo silicon compound (which has a structure represented by the chemical formula illustrated in col. 172, claim 1), using an etching gas containing at least one halogen atoms selected from ***chlorine, bromine and iodine*** (Abstract; col. 2, lines 24-26, 36-39 and 53-55; Claim 1). ***The etching gas used in Sato is neither perfluorohydrocabon nor unsaturated fluorohydrocarbon.***

Nakamura discloses use of a dry etching gas comprising a compound having a triple bond and having a skeletal structure with fluorocarbon. Nakamura mentions perfluoro- 2-pentyne ($CF_3C{\equiv}CCF_2CF_3$) as one example of the compound having a triple bond and having a skeletal structure with fluorocarbon. However, Nakamura specifically discloses only perfluoro-2-butyne ($CF_3C{=}CCF_3$) in the Example. More specifically it is shown in Example 1 that perfluoro-2-butyne exhibits an etching rate for SiO_2 of 580 nm/min, ***which is rather poor than that (i.e., 610 nm/min) of the conventional cyclobutane (c-C_4F_8),*** but perfluoro-2-butyne exhibits a high selectivity ratio for silicon oxide (i.e., 2.5), which is larger than that (i.e., 2.0) of the cyclobutane (see Table 1 on page 14). Nakamura does not give any working example for perfluoro-2-pentyne.

As shown in the working example in the present application, perfluoro-2-butyne exhibits selectivity ratios of 14.1 (central portion of SiO_2 film) and 9.2 (edge portion thereof) (Table 1, Ex.2, dry etching gas B) . In contrast, perfluoro-2-pentyne exhibits selectivity ratios of 18.5 (central portion) and 13.6 (edge portion) (Table 1, Ex. 1, dry etching gas A).

TABLE 1

	Examples					
	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Com. Ex. 1	Ex. 5
Resist	for ArF laser					for X-ray
Dry etching gas	A	B	C	D	E	A
	Etching rate					
Silicon oxide film						
Central portion	621.0	593.5	518.4	521.2	500.9	550.1
Edge portion	564.1	520.4	410.2	415.4	468.9	516.2
Resist						
Central portion	33.6	42.1	43.9	43.4	156.5	44.7
Edge portion	41.5	56.6	65.1	63.9	426.3	51.1
	Selectivity					
Central portion	18.5	14.1	11.8	12.0	3.2	12.3
Edge portion	13.6	9.2	6.3	6.5	1.1	10.1

Dry etching gas A: Perfluoro-2-pentyne
B: Perfluoro-2-butyne
C: Perfluoro-2-pentene
D: Perfluoro-1,3-butadiene
E: Perfluoropropene
Etching rate, unit: nm/min
Selectivity ratio: (etching rate for silicon oxide film)/(etching rate for resist)

That is, perfluoro-2-pentyne exhibits a selectivity ratio for SiO_2 film unexpectedly much higher than that of perfluoro-2-butyne. Perfluoro-2-pentyne is more suitable than perfluoro-2-butyne, for a dry etching method wherein a resist film is irradiated with radiation with a wavelength of not greater than 195 nm to form a resist pattern having a minimum line width of not greater than 200 nm, and the thus-formed resist pattern is subjected to dry etching. Nowhere is this taught by combining the references.

Based on the references, the skilled artisan would have *no motivation* for modifying Sato' s etching gas for use in the etching of the specific organo silicon compound, with Nakamura' s etching gas, which has a triple bond and a skeletal structure with fluorocarbon. Even if Sato' s etching gas is modified with Nakamura's etching gas, perfluoro-2-butyne would be used as in the working example and the claimed subject matter would not be realized.

For the combination of the references to create a *prima facie* rejection of obviousness, the references must *logically* teach what is claimed. Simply put, the references when combined lack enough disclosure to teach the method of:

irradiating a substrate with a resist film formed thereon with radiation having a wavelength of not more than 195 nm to form a resist pattern having a minimum line width of not more than 200 nm,

subjecting the substrate having the resist pattern formed thereon to dry etching using, an etching gas perfluoro-2-pentyne.

It is therefore respectfully requested that the rejection be reconsidered and withdrawn.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al (6,270,948) in view of Nakamura et al (WO 02/39494 Al) as applied to claims 1, 2 above, and further in view of Collins et al (5,556,501). (Office Action, Page 4)

Claim 6 is dependent from claim 1. This rejection is rebutted for the same reasons as the rejection above, thus no additional comments need to be made here.

Sato is irrelevant to the claimed subject matter and it would be clear that Nakamura is not technically combinable with Sato. Assuming *arguendo* that if they were combined, there is still no teaching of the claimed method, or any suggestion of results of the claimed method, and thus no *prima facie* rejection can be made from this combination, including Collins. In view of the above amendment, applicant believes the pending application is in condition for allowance.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 04-1105.

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Respectfully submitted,

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